Listing of Claims:

This listing of claims replaces all prior versions and listings of claims in the application.

Claims 1-60 (Cancelled).

Claim 61 (Currently amended): An inspection apparatus for inspecting an object to be inspected by irradiating either of charged particles or electromagnetic waves onto said object to be inspected, said apparatus comprising:

a working chamber for inspecting said object to be inspected, said chamber capable of being controlled to have a vacuum atmosphere;

a beam generating means for generating either of said charged particles or said electromagnetic waves as a beam;

an electron optical system including an objective lens for guiding and irradiating said beam onto said object to be inspected held in said working chamber, detecting secondary charged particles emanated from said object to be inspected by a detector and introducing said secondary charged particles to an image processing system;

said image processing system for forming an image by said secondary charged particles;

a data processing system for displaying and/or storing status information of said object to be inspected based on output from said image processing system;

a stage device for operatively holding said object to be inspected so as to be movable with respect to said beam,

wherein said stage device permits highly accurate alignment of said object to be inspected by comprising a holder within said working chamber which holds said object in the x-direction, y-direction with respect to said beam, and in the direction about the axis normal to the

object supporting surface of said holder,

wherein said image processing system includes a CCD or a TDI image sensor, and

a carrying mechanism for securely accommodating said object to be inspected and for transferring said object to or from said working chamber,

said carrying mechanism comprises:

a mini-environment chamber for supplying a clean gas as a laminar downflow to said object to be inspected to prevent dust from contacting said object to be inspected, said mini-environment chamber includes a gas supply unit including a cleaning filter such as HEPA or ULPA filter for creating said clean gas, a pre-aligner for aligning the orientation of said object to be inspected in a rotation direction about the axis of said object for rough alignment thereof, and a suction duct disposed at a position below a carrier unit carrying said object within said chamber for sucking the gas from underside of said carrier unit;

a first loading chamber and a second loading chamber disposed between said mini-environment chamber and said working chamber, and adapted to be independently controllable so as to have a vacuum atmosphere; said second loading chamber being held in a high vacuum atmosphere, and

a loader having a carrier unit capable of transferring said object to be inspected between said mini-environment chamber and said first loading chamber, and another carrier unit disposed within said second loading chamber for ~~capable of~~ transferring said object to be inspected between said second loading chamber and said stage device,

wherein said beam generating means comprises a thermal electron beam source including LaB_6 as a cathode, the tip portion of which is formed into a cone shape or formed into a

truncated cone shape, and

wherein said electron optical system includes a primary optical system having a multi-stage multi-pole lens system and forming the telecentric electronic optical system for providing the Koehler illumination.

Claim 62 (Previously presented): An inspection apparatus according to claim 61, further comprising:

an alignment controller for observing the surface of said object to be inspected with respect to said electron-optical system to control the alignment, said alignment controller includes an optical microscope for effecting a rough alignment of the object to be inspected in a wide field before a high magnification alignment for inspection is made by said electron-optical system,

wherein said inspection apparatus is a projection type electron beam inspection apparatus and includes an electrode between said object to be inspected and said objective lens so as to control the electric field between said object and said objective lens.

Claim 63 (Previously presented): An inspection apparatus according to claim 61, further comprising:

a vacuum exhausting system for generating the vacuum atmosphere in said working chamber,

said vacuum exhausting system comprises a vacuum pump including a turbo molecular pump as a main exhaust pump and a dry pump of a Roots type as a roughing vacuum pump, and

an interlock mechanism, wherein the vacuum level in said working chamber is monitored; and in the case of irregularity, said interlock mechanism executes an emergency control to secure the vacuum level at a safe level,

wherein said inspection apparatus is a projection type electron beam inspection apparatus and includes an electrode between said object to be inspected and said objective lens so as to control the electric field between said object and said objective lens.

Claim 64 (Currently amended): An inspection apparatus for inspecting an object to be inspected by irradiating either of charged particles or electromagnetic waves onto said object to be inspected, said apparatus comprising:

a working chamber for inspecting said object to be inspected, said chamber capable of being controlled to have a vacuum atmosphere;

a beam generating means for generating either of said charged particles or said electromagnetic waves as a beam;

an electron optical system including an objective lens for guiding and irradiating said beam onto said object to be inspected held in said working chamber, detecting secondary charged particles emanated from said object to be inspected by a detector and introducing said secondary charged particles to an image processing system;

said image processing system for forming an image by said secondary charged particles;

a data processing system for displaying and/or storing status information of said object to be inspected based on output from said image processing system;

a stage device for operatively holding said object to be inspected so as to be movable

with respect to said beam,

wherein said stage device permits highly accurate alignment of said object to be inspected by comprising a holder within said working chamber which holds said object in the x-direction, y-direction with respect to said beam, and in the direction about the axis normal to the object supporting surface of said holder,

wherein said image processing system includes a CCD or a TDI image sensor,

a carrying mechanism for securely accommodating said object to be inspected and for transferring said object to or from said working chamber,

said carrying mechanism comprises:

a mini-environment chamber for supplying a clean gas as a laminar downflow to said object to be inspected to prevent dust from contacting said object to be inspected,

said mini-environment chamber includes a gas supply unit including a cleaning filter such as HEPA or ULPA filter for creating said clean gas, a pre-aligner for aligning the orientation of said object to be inspected in a rotation direction about the axis of said object for rough alignment thereof, and a suction duct disposed at a position below a carrier unit carrying said object within said chamber for sucking the gas from underside of said carrier unit; and

an alignment controller for observing the surface of said object to be inspected with respect to said electron-optical system to control the alignment, said alignment controller includes an optical microscope for effecting a rough alignment of the object to be inspected in a wide field before a high magnification alignment for inspection is made by said electron-optical system,

a first loading chamber and a second loading chamber disposed between said mini-

environment chamber and said working chamber, and adapted to be independently controllable so as to have a vacuum atmosphere; said second loading chamber being held in a high vacuum atmosphere, and

a loader having a carrier unit capable of transferring said object to be inspected between said mini-environment chamber and said first loading chamber, and another carrier unit disposed within said second loading chamber for transferring said object to be inspected between said second loading chamber and said stage device,

wherein said beam generating means comprises a thermal electron beam source including LaB_6 as a cathode, the tip portion of which is formed into a cone shape or formed into a truncated cone shape, and

wherein said electron optical system includes a primary optical system having a multi-stage multi-pole lens system and forming the telecentric electronic optical system for providing the Koehler illumination.

Claim 65 (Previously presented): An inspection apparatus according to claim 64, further comprising:

a vacuum exhausting system for generating the vacuum atmosphere in said working chamber,

said vacuum exhausting system comprises a vacuum pump including a turbo molecular pump as a main exhaust pump and a dry pump of a Roots type as a roughing vacuum pump, and an interlock mechanism, wherein the vacuum level in said working chamber is monitored; and in the case of irregularity, said interlock mechanism executes an emergency control to secure the

vacuum level at a safe level,

wherein said inspection apparatus is a projection type electron beam inspection apparatus and includes an electrode between said object to be inspected and said objective lens so as to control the electric field between said object and said objective lens.

Claim 66 (Currently amended): An inspection apparatus for inspecting an object to be inspected by irradiating either of charged particles or electromagnetic waves onto said object to be inspected, said apparatus comprising:

a working chamber for inspecting said object to be inspected, said chamber capable of being controlled to have a vacuum atmosphere;

a beam generating means for generating either of said charged particles or said electromagnetic waves as a beam;

an electron optical system including an objective lens for guiding and irradiating said beam onto said object to be inspected held in said working chamber, detecting secondary charged particles emanated from said object to be inspected by a detector and introducing said secondary charged particles to an image processing system;

said image processing system for forming an image by said secondary charged particles;

a data processing system for displaying and/or storing status information of said object to be inspected based on output from said image processing system;

a stage device for operatively holding said object to be inspected so as to be movable with respect to said beam,

wherein said stage device permits highly accurate alignment of said object to be

inspected by comprising a holder within said working chamber which holds said object in the x-direction, y-direction with respect to said beam, and in the direction about the axis normal to the object supporting surface of said holder,

wherein said image processing system includes a CCD or a TDI image sensor,

a carrying mechanism for securely accommodating said object to be inspected and for transferring said object to or from said working chamber,

said carrying mechanism comprises:

a mini-environment chamber for supplying a clean gas as a laminar downflow to said object to be inspected to prevent dust from contacting said object to be inspected, said mini-environment chamber includes a gas supply unit including a cleaning filter such as HEPA or ULPA filter for creating said clean gas, a pre-aligner for aligning the orientation of said object to be inspected in a rotation direction about the axis of said object for rough alignment thereof, and a suction duct disposed at a position below a carrier unit carrying said object within said chamber for sucking the gas from underside of said carrier unit; a first loading chamber and a second loading chamber disposed between said mini-environment chamber and said working chamber, and adapted to be independently controllable so as to have a vacuum atmosphere; said second loading chamber being held in a high vacuum atmosphere,

a loader having a carrier unit capable of transferring said object to be inspected between said mini-environment chamber and said first loading chamber, and another carrier unit disposed within said second loading chamber for transferring said object to be inspected between said second loading chamber and said stage device,

and

a vacuum exhausting system for generating the vacuum atmosphere in said working chamber,

said vacuum exhausting system comprises a vacuum pump including a turbo molecular pump as a main exhaust pump and a dry pump of a Roots type as a roughing vacuum pump, and an interlock mechanism, wherein the vacuum level in said working chamber is monitored; and in the case of irregularity, said interlock mechanism executes an emergency control to secure the vacuum level at a safe level,

wherein said beam generating means comprises a thermal electron beam source including LaB_6 as a cathode, the tip portion of which is formed into a cone shape or formed into a truncated cone shape, and

wherein said electron optical system includes a primary optical system having a multi-stage multi-pole lens system and forming the telecentric electronic optical system for providing the Koehler illumination.

Claim 67 (Currently amended): An inspection apparatus for inspecting an object to be inspected by irradiating either of charged particles or electromagnetic waves onto said object to be inspected, said apparatus comprising:

a working chamber for inspecting said object to be inspected, said chamber capable of being controlled to have a vacuum atmosphere;

a beam generating means for generating either of said charged particles or said electromagnetic waves as a beam;

an electron optical system including an objective lens for guiding and irradiating said

beam onto said object to be inspected held in said working chamber, detecting secondary charged particles emanated from said object to be inspected by a detector and introducing said secondary charged particles to an image processing system;

said image processing system for forming an image by said secondary charged particles;

a data processing system for displaying and/or storing status information of said object to be inspected based on output from said image processing system;

a stage device for operatively holding said object to be inspected so as to be movable with respect to said beam,

wherein said stage device permits highly accurate alignment of said object to be inspected by comprising a holder within said working chamber which holds said object in the x-direction, y-direction with respect to said beam, and in the direction about the axis normal to the object supporting surface of said holder,

wherein said image processing system includes a CCD or a TDI image sensor;

a carrying mechanism for securely accommodating said object to be inspected and for transferring said object to or from said working chamber;

said carrying mechanism comprises:

a mini-environment chamber for supplying a clean gas as a laminar downflow to said object to be inspected to prevent dust from contacting said object to be inspected, said mini-environment chamber includes a gas supply unit including a cleaning filter such as HEPA or ULPA filter for creating said clean gas, a pre-aligner for aligning the orientation of said object to be inspected in a rotation direction about the axis of said object for rough alignment thereof, and a suction duct disposed at a position below a carrier unit carrying said object within said chamber

for sucking the gas from underside of said carrier unit,

a first loading chamber and a second loading chamber disposed between said mini-environment chamber and said working chamber, and adapted to be independently controllable so as to have a vacuum atmosphere, said second loading chamber being held in a high vacuum atmosphere, and

a loader having a carrier unit capable of transferring said object to be inspected between said mini-environment chamber and said first loading chamber, and another carrier unit disposed within said second loading chamber for ~~capable of~~ transferring said object to be inspected between said second loading chamber and said stage device;

an alignment controller for observing the surface of said object to be inspected with respect to said electron-optical system to control the alignment, said alignment controller includes an optical microscope for effecting a rough alignment of the object to be inspected in a wide field before a high magnification alignment for inspection is made by said electron-optical system; and

a vacuum exhausting system for generating the vacuum atmosphere in said working chamber,

said vacuum exhausting system comprises a vacuum pump including a turbo molecular pump as a main exhaust pump and a dry pump of a Roots type as a roughing vacuum pump, and an interlock mechanism, wherein the vacuum level in said working chamber is monitored; and in the case of irregularity, said interlock mechanism executes an emergency control to secure the vacuum level at a safe level,

wherein said beam generating means comprises a thermal electron beam source including

LaB_6 as a cathode, the tip portion of which is formed into a cone shape or formed into a truncated cone shape, and

wherein said electron optical system includes a primary optical system having a multi-stage multi-pole lens system and forming the telecentric electronic optical system for providing the Koehler illumination.

Claim 68 (Previously presented): An inspection apparatus according to claim 67, wherein said mini-environment chamber is provided therein with a sensor for observing the cleanliness within said mini-environment chamber such that the inspection apparatus is shut down when the cleanliness is below a predetermined level,

wherein said inspection apparatus is a projection type electron beam inspection apparatus and includes an electrode between said object to be inspected and said objective lens so as to control the electric field between said object and said objective lens.

Claim 69 (Previously presented): An inspection apparatus according to claim 67, further comprising:

a precharge unit for irradiating a charged particle beam or photo electrons onto said object to be inspected placed in said working chamber to reduce variations in charge on said object to be inspected,

wherein said precharge unit comprises a UV lamp coated with a photoelectron emission material for emitting a photoelectron the energy thereof being 0eV – 10eV.

Claim 70 (Previously presented): An inspection apparatus according to claim 67, wherein said apparatus includes an apparatus for irradiating a charged particle beam against the surface of the object to be inspected loaded on an XY stage while moving said object to a desired position in vacuum atmosphere,

said XY stage being provided with a non-contact supporting mechanism by means of a hydrostatic bearing and a vacuum sealing mechanism by means of differential exhausting, and

a divider is provided for making the conductance smaller between the charged particle beam irradiating region and the hydrostatic bearing support section, so that there is a pressure difference produced between said charged particle beam irradiating region and said hydrostatic bearing support section,

wherein said inspection apparatus is a projection type electron beam inspection apparatus and includes an electrode between said object to be inspected and said objective lens so as to control the electric field between said object and said objective lens.

Claim 71 (Previously presented): An inspection apparatus according to claim 67, wherein said electron optical system includes:

an E x B separator for deflecting said secondary charged particle toward said detector by a field where an electric field and a magnetic field cross at right angle, said E x B separator includes at least a pair of electrodes for generating the electric field and a pair of electrodes for generating the magnetic field,

wherein said inspection apparatus is a projection type electron beam inspection apparatus and includes an electrode between said object to be inspected and said objective lens so as to control the electric field between said object and said objective lens.

Claim 72 (Previously presented): An inspection apparatus according to claim 61, wherein said beam irradiated on said object comprises a multi-beam,

wherein said inspection apparatus is a projection type electron beam inspection apparatus and includes an electrode between said object to be inspected and said objective lens so as to control the electric field between said object and said objective lens.

Claim 73 (Previously presented): An inspection apparatus according to claim 61, further comprising:

an electrode provided between said objective lens and said object to be inspected which is supplied with a predetermined voltage lower than that applied to said object to be inspected,

wherein said inspection apparatus is a projection type electron beam inspection apparatus and includes an electrode between said object to be inspected and said objective lens so as to control the electric field between said object and said objective lens.

Claim 74 (Previously presented): An inspection apparatus according to claim 61, further comprising:

a precharge unit for irradiating charged particles on said object to be inspected to prevent variations in the amount of charge on the surface of the object, the voltage for the energy of the charged particles is set to a landing voltage lower than 30 eV,

wherein said inspection apparatus is a projection type electron beam inspection apparatus and includes an electrode between said object to be inspected and said objective lens so as to control the electric field between said object and said objective lens.

Claim 75 (New): An inspection apparatus according to claim 61, wherein said mini-environment chamber, said first loading chamber, said second loading chamber and said working chamber are disposed adjacent to each other in this order.

Claim 76 (New): An inspection apparatus according to claim 75, wherein a shutter device is provided between each of said adjacent chambers for selectively blocking communication therebetween.

Claim 77 (New): An inspection apparatus according to claim 64, wherein said mini-environment chamber, said first loading chamber, said second loading chamber and said working chamber are disposed adjacent to each other in this order.

Claim 78 (New): An inspection apparatus according to claim 77, wherein a shutter device is provided between each of said adjacent chambers for selectively blocking communication therebetween.

Claim 79 (New): An inspection apparatus according to claim 66, wherein said mini-environment chamber, said first loading chamber, said second loading chamber and said working chamber are disposed adjacent to each other in this order.

Claim 80 (New): An inspection apparatus according to claim 79, wherein a shutter device is provided between each of said adjacent chambers for selectively blocking communication therebetween.

Claim 81 (New): An inspection apparatus according to claim 67, wherein said mini-environment chamber, said first loading chamber, said second loading chamber and said working chamber are disposed adjacent to each other in this order.

Claim 82 (New): An inspection apparatus according to claim 75, wherein a shutter device is provided between each of said adjacent chambers for selectively blocking communication therebetween.